

British Astronomical Association Radio Astronomy Group

August 2011 Update

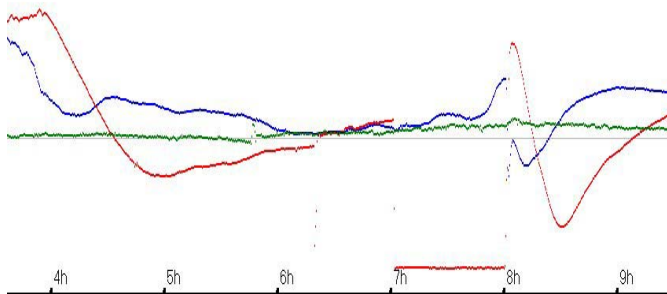
Welcome to another RAG Update, and to the 11 people who have joined the baa-rag discussion group (baa-rag@yahoogroups.com) since I produced the last one. We now have 134 registered members, though the large majority are 'lurkers' rather than contributors. There are perhaps another 100 who have expressed an interest in radio astronomy (and hence are recipients of this email) but who are not on the baa-rag list. Please note that you do not have to be a BAA member to join or contribute.

If you have received duplicate copies of this Update (or wish to unsubscribe from my consolidated list) please let me know.

Please note our November meeting in Northampton. We need to know numbers in advance so that we get the catering numbers right, so please let me know if you plan on attending. Details are at the end of this Update, or on the RAG website at www.britastro.org/radio/. If you have a poster of your observations to display or, better still, if you have a 20 minute presentation on your work, we will make space for you!

Record Flare event for Cycle 24

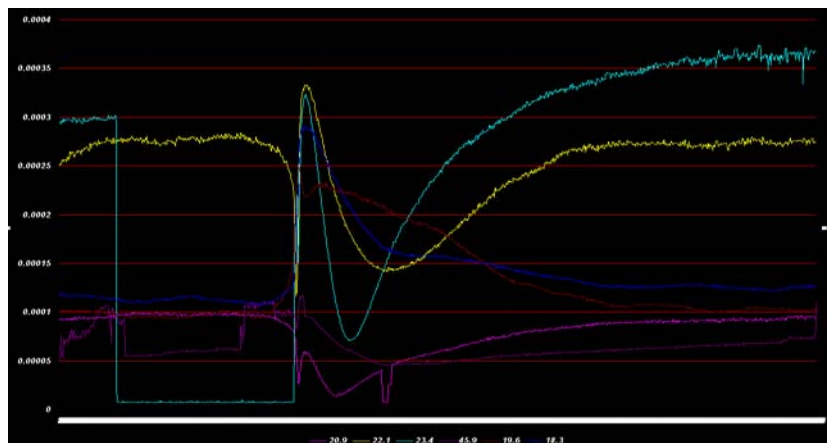
We had a substantial X-ray flare event at 08:01 UT on 9th August, measuring X6.7. That makes it by far the largest X-ray flare for several years, though still some way short of the X9 event of December 2006, and the all-time record of over X28 (the sensor saturating at this point) recorded in November 2003. By contrast, the famous Carrington 'super flare' event of 1859 has been estimated at up to X42 from magnetograms recorded at Greenwich and Kew. As you would expect, a number of members recorded Tuesday's event:



From John Cook

The green trace is from John's magnetometer.

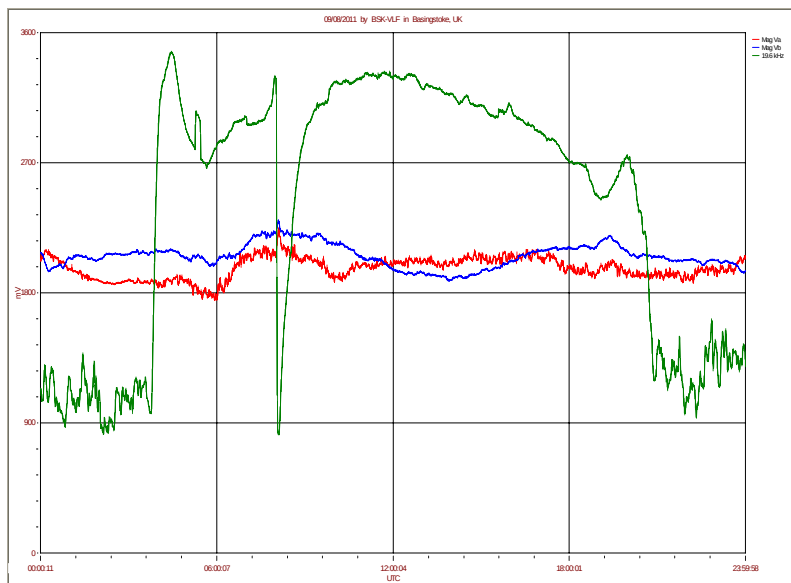
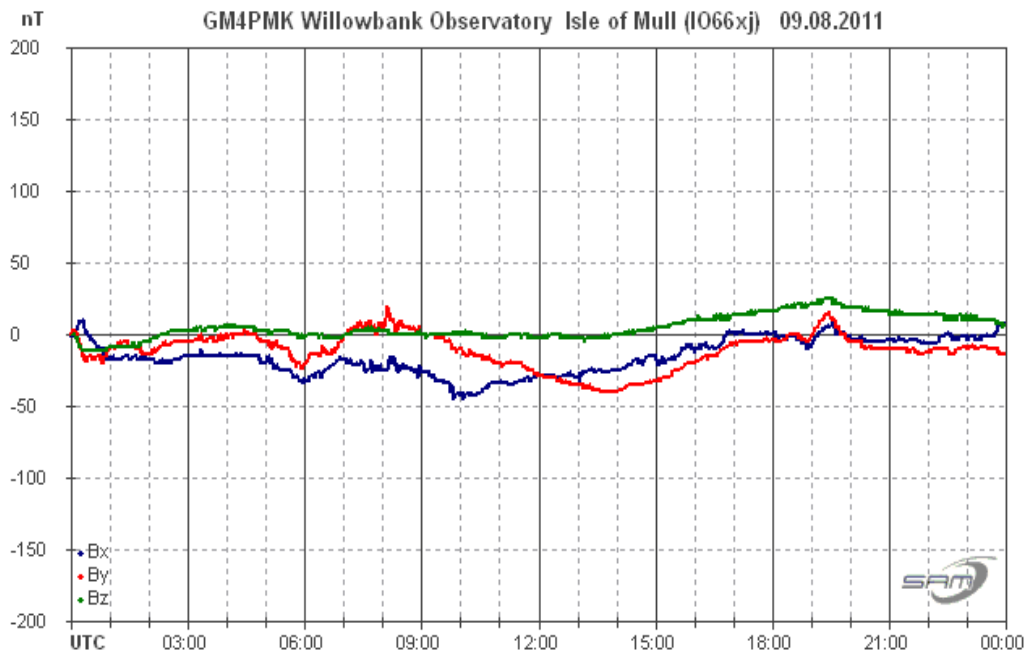
and from
Mark Edwards



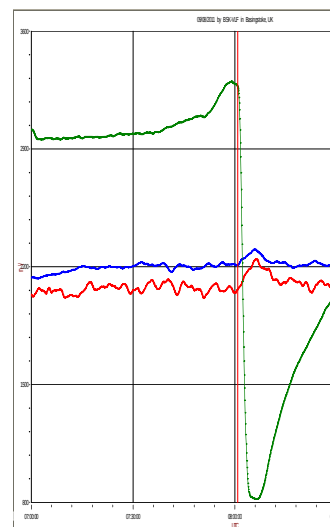
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An interesting feature of this SID was that it was associated with a (small) disturbance to the magnetosphere. There is a hint of this in John's chart but a clearer indication in that from Roger Blackwell:



This is my effort, overlaying the VLF



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trace on the magnetometer results:

Of course there is a strong connection between solar flares and the earth's magnetosphere through consequential variations in the solar wind, the most notable being the sudden impact of a shock wave from a Coronal Mass Ejection event, as illustrated later in this Update. However these events happen a couple of days after the originating flare. Simultaneous SID and magnetic variations suggest that the earth's magnetosphere is being affected by the increased X-ray and UV radiation resulting from the event.

I had not seen this phenomena until I was prompted to look for it by Whit Reeve, since when I have noted three occasions where a variation in magnetic field appears at the same time as a SID event. However there have been many more times when a large SID has not been synchronised with any magnetic event.

The effect is documented, termed a solar flare effect or sfe. In fact the estimation of the magnitude of the Carrington event was based upon an sfe recorded on the magnetograms, and not on the size of any subsequent magnetic storm. It does not appear to have received much (any?) attention in amateur observations. It may be interesting to look for further instances and if there is any explanation as to why they are seen, but more often, not seen.

Using Software Defined radio for Radio Astronomy

David Morgan has been evaluating the FUNcube Dongle, a low-cost SDR receiver developed for use with the FUNcube amateur satellite. I went to a very enjoyable presentation on the development of this receiver at the recent Amsat UK Colloquium – it really was an eye-opener on what can be achieved by using the components and software tools now available, not to mention what some people use their kitchens and pizza ovens for!



The USB-based FUNcube Dongle, available at http://www.funcubedongle.com/?page_id=286

The device is based around chips used in consumer television decoders, with a PIC-based microcontroller to tie it all together. As David notes, although intended for satellite communications, the FCD is capable of acting as the heart of a simple radio telescope. Initial tests suggest that it is both sensitive and stable enough to replace conventional communications receivers as part of a radio telescope, so at less than £130 the FCD SDR represents a significant saving over the £500 - £1,000+ you need to pay for a traditional design, though you still need the additional LNA and other components (such as a dish!) for a full

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instrument. It is reconfigurable to operate over a wide range of frequencies from VHF to high L band, so can be used to observe at many of the frequencies reserved for radio astronomy.

In the future, the possibility may exist to develop an SDR radio telescope 'kit' that amateurs could obtain for perhaps half the cost of a decent optical telescope. This should encourage many more people interested in radio astronomy to consider setting up a radio telescope of their own.

This is a concept at the moment and we need people to help with further experimentation. This would make a good project for a number of like-minded individuals to embark on, and perhaps collaborative efforts between local Astronomical and Amateur Radio Societies (out of which this product originated) could bear fruit.

You can find David's full paper at <http://www.britastro.org/radio/projects/otherproj.html>

Impact of multiple CMEs

There were separate CME events on the 2nd August (06:36 UT), 3rd August (13:48) and 4th August (04:12). Over the next couple of days the ejected plasma clouds crossed the 150 million kilometres to the earth's orbit to create a sizeable magnetic storm. Roger Blackwell noted that his SAM magnetometer auto-ranged upwards, an unusual event even at his latitude. The following charts shows the onset of the event and the hangover into the following day, the first from Martyn Kinder and the subsequent two from Roger Blackwell.

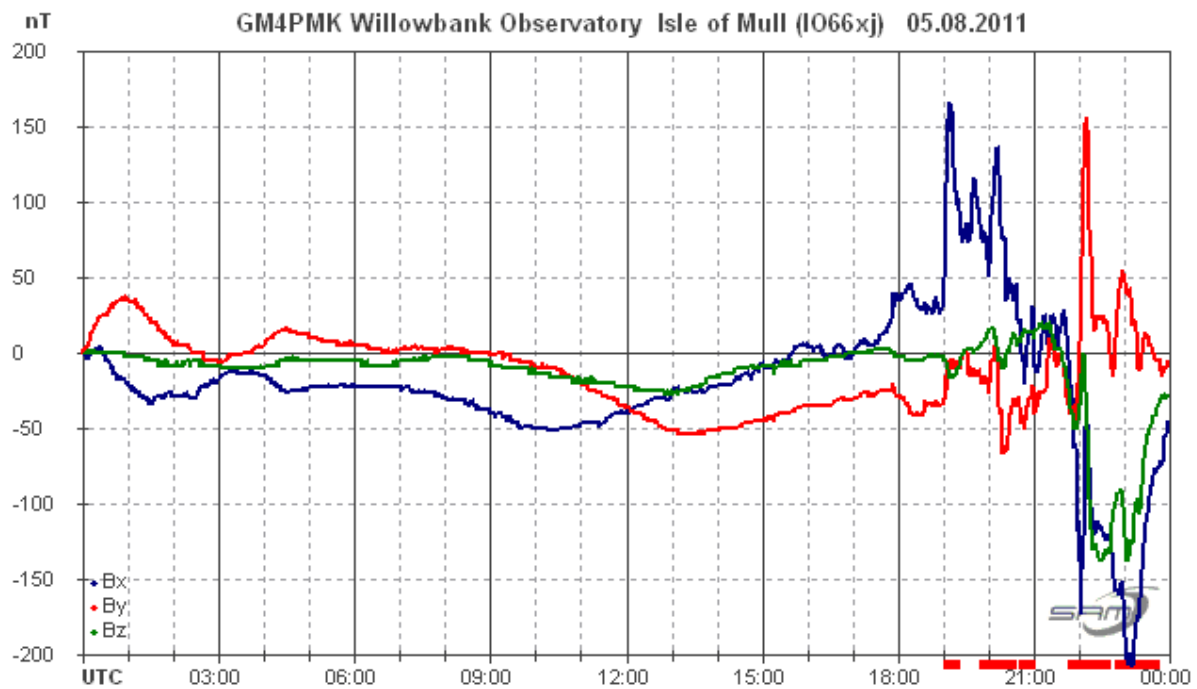


Va and Vb traces offset for visibility.

Red shows the temperature.

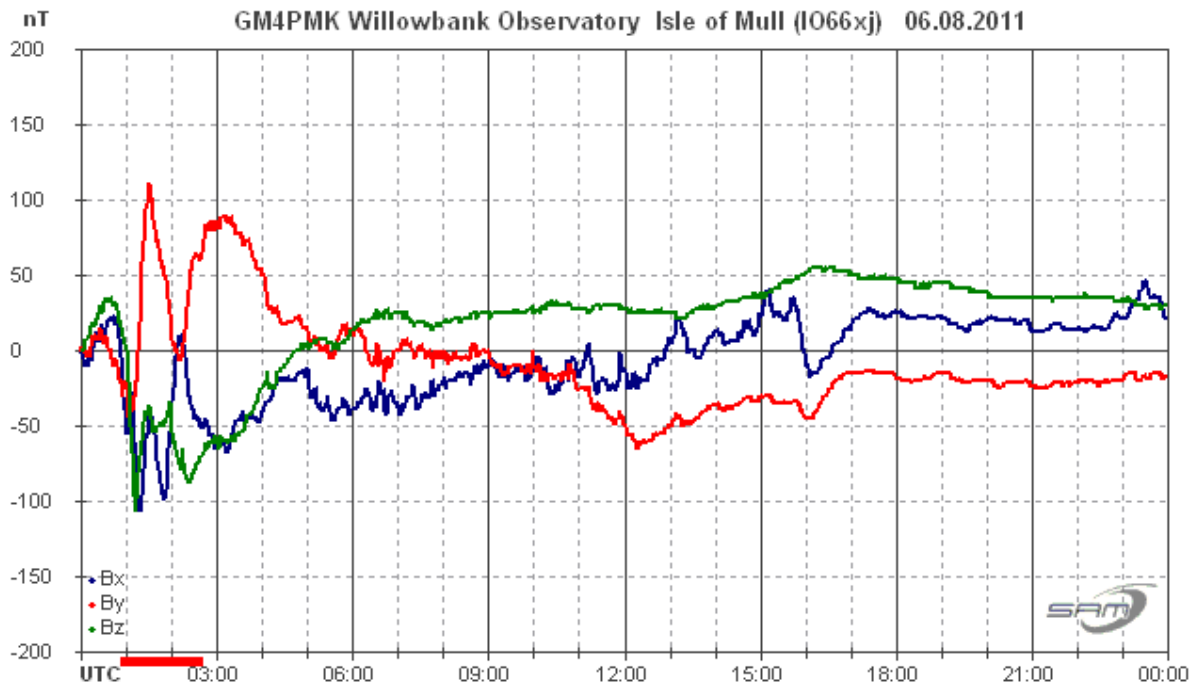
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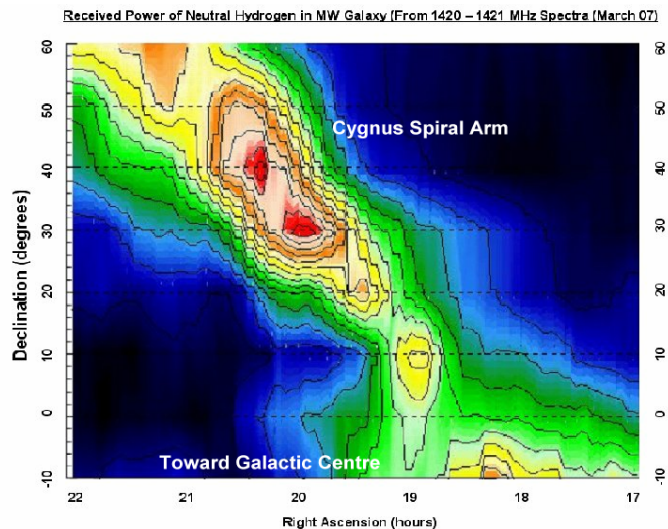


It seems that the three CME events that were spread over some 46 hours resulted in a much shorter duration storm, indicating that the plasma clouds were travelling at different speeds with the later ones catching up to produce a bunched series of shocks over the space of a few hours. The original ejection speed has a lot to do with this, and is worthy of study.

BAA RAG website

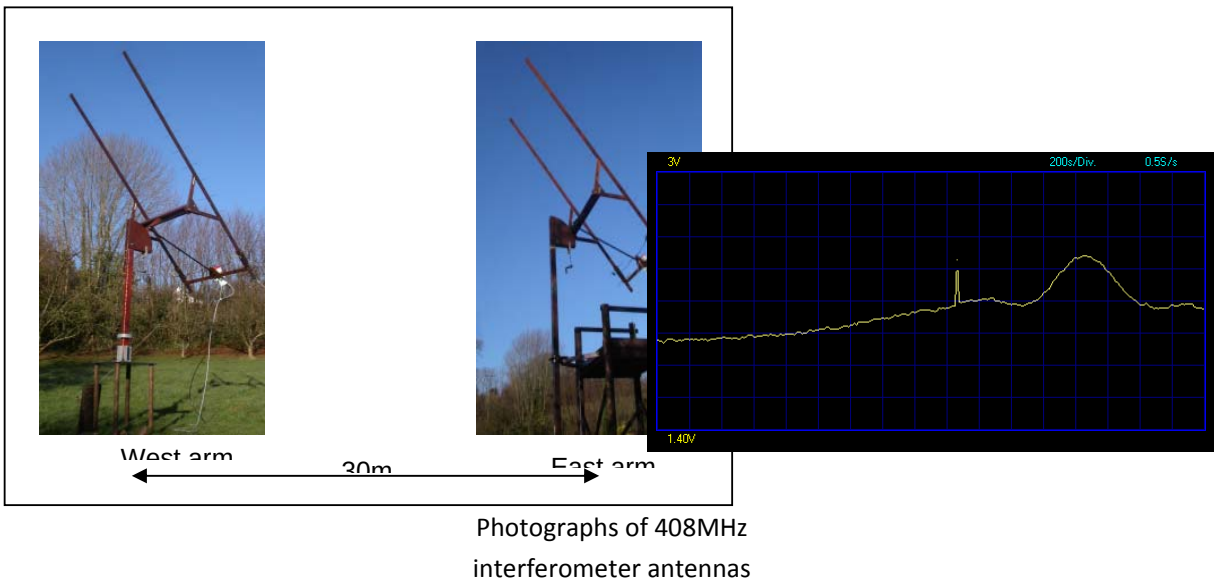
As well as the discussion board mentioned at the start of this Update, we have the RAG website at www.britastro.org/radio/ which has had a lot of good material added recently courtesy of David Morgan. David has carried been very active over the past few years and has produced some outstanding results.

Definitely worth a read!



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12 GHz experiments



The last Update had a couple of pictures of William Williamson's ship's satellite TV receiver system, sporting a 1.2m dish in a radome.

Here is another, this time naked.

And a lunar transit observed on the 11th July.

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William notes: "Snag was, because I live so far north the moon's altitude was less than seven degrees. My dish is next to a road which it had to "look" across to see the moon. Although it is a quiet country road I think I was lucky that only one vehicle passed by ,as shown by the spike."

BAA RAG General Meeting – 12th November 2011

The BAA Radio Astronomy Group is holding a one-day General Meeting on Saturday 12th November at the Humfrey Rooms, Castilian Terrace, Northampton, NN1 1LD. The two keynote speakers will be Professor Paul Alexander who is Head of the Astrophysics Group at Cambridge and the project leader for the UK contribution to the Square Kilometre Array, and Dr Ben Stappers from Jodrell Bank who is Head of the Pulsar Science Working Group for the LOFAR radio telescope.

The plan is to have a number of short (20 - 30 minute) presentations on the work being carried out by members of the Radio Astronomy Group, plus displays of results and the equipment used to obtain them. Please let me know if you have anything to offer here, either a presentation or the display of results (it is six months away so you have the time!) Tickets are on sale now at £15, or £12 for BAA members, and include a buffet lunch and refreshments. Cheques should be made payable to "Radio Astronomy Group" and sent to P. Hyde, 25 Merton Road, Basingstoke, RG21 5UA. Please be sure to include your own address (or preferably an email address) for confirmation of receipt. Alternatively please contact me if you want to do a direct bank transfer.

Further information will be published on the BAA RAG website as it becomes available.

Data Store for VLF observations

Andrew Lutley has set up a central store for vlf observations from which you can download records as required. At the moment it is located at <http://www.gocio.co.uk/VLF.htm> and contains more than 5,500 records going back some 10 years.

The aim is to allow people to compare their results with those from other observers, both to help understand better why a particular trace looks the way it does and to begin to appreciate the effect of the observer's location on the shape of the trace, particularly when a SID occurs. It has also provoked some interesting discussion between contributors about several theoretical issues, which can be explored by examining the data. Andrew will be interested in any feedback people may have, whether positive or negative.

UKRAA Magnetometer

For those interested in doing magnetometry, UKRAA will shortly be adding John Cook's design to their list of products. See <http://www.ukraa.com/www/> for more details.

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Points of Interest

The BAA RAG Twitter feed has now accumulated over 100 followers. You don't have to be one of these to access items of interest, just visit the BAA RAG website and follow the link from there. The latest items are:

- ⤴ Early imaging results from LOFAR - see http://arxiv.org/PS_cach...
- ⤴ 30 years on, the VLA is still struttin' its stuff <http://www.nrao.edu/pr/2...>
- ⤴ Latest NRAO Newsletter is now at <https://science.nrao.edu...> with the latest on ALMA and EVLA
- ⤴ A day in the life of ... working at the VLA - see <http://vimeo.com/22586230>

If you do have anything that you are prepared to share, please get in touch with Martyn Kinder, the RAG webmaster. If you have any thoughts on how you would like to see the website developed, please contact either Martyn or myself.

As always, any comments or queries on the contents of this Update are welcome! It is always good to hear of experiences in these and other RA-related areas.

Best wishes,

Paul Hyde
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BAA RAG Coordinator